

**REMARKS**

Upon entry of the Amendment above, claims 45 and 49-57 will be pending in this application. By this amendment, claims 51, 53, 54 and 56 have been amended.

No new matter has been added as a result of the Amendment above. Claim 51 has been amended to recite “curing the polymer” and claims 53, 54, and 56 have been amended to recite that the polymer has been cured. Support for the amendments are inherent in the specification and can be found, *e.g.*, in various Examples where the polymers were cured.

Status identifiers for claims 52 and 56 have been appropriately changed as required by the February 15, 2007 communication.

Reconsideration of the merits of the application is respectfully requested in light of the Amendment above and the Remarks that follow.

**Comments regarding Amendments in Office Action of May 5, 2006**

In Applicant’s Amendment and Response filed on May 5, 2006, claim 45 was amended to delete the words “at least partially.” It should be noted that this amendment to claim 45 was for the purposes of clarity. Prior to the May 5, 2006 amendment, claim 45 stated that the “polyurethane polymer was at least partially encapped at a terminal position ...” (emphasis added). As amended in the May 5, 2005 Response, claim 45 now clearly points out that the polyurethane polymer may be partially endcapped, but that at least one terminal position (*i.e.*, the terminal position referred to in claim 45) the polyurethane polymer is encapped. A specific terminal position of the polymer either is or is not endcapped – it cannot be partially endcapped at the specific position. The May 5, 2005 amendment to claim 45 took this into account, making the claim more clear.

**§ 112 Rejection of the Claims**

Claims 51-54 and 56 have been rejected to as being indefinite under 35 U.S.C. § 112, first paragraph, as allegedly not being enabled by the specification. Applicant traverses the rejection to the extent it is maintained.

The Office Action stated that “a water soluble polyurethane composition would have too short a life to provide the claimed antimicrobial effects, when in the presence of water, such as rain on a roof shingle . . . the polymer must not be in a water soluble form as claimed, if it is at all useful as an antimicrobial applied on articles.”

Claim 51 has been amended to recite “curing the polymer” and claims 53, 54, and 56 have been amended to recite that the polymer has been cured. It is understood that cured polyurethanes are largely water insoluble. Accordingly, methods or articles according to claims 51, 53, 54, or 56 that include cured polymer compositions according to claim 45 would serve as biocidals in environments including water, such as rain on a roof. Withdrawal of the rejection of claims 51, 53, 54 and 56 is respectfully requested.

Claim 52 refers to an article including a substrate coated with the polymeric composition of claim 45. Claim 52 does not refer to antimicrobial effects. As such, it is unclear as to why claim 52 was rejected as not being enabled by the specification. Withdrawal of the rejection of claim 52, or in the alternative clarification, is respectfully requested.

### **§ 103 Rejection of the Claims**

Claims 45 and 49-57 have been rejected under 35 U.S.C. § 103 as allegedly being obvious over U.S. Patent No. 4,451,635 (“Gould”), in view of U.S. Patent No. 3,931,319 (“Green”) and U.S. Patent No. 4,110,286 (“Vandergaer”). Applicant respectfully traverses the rejection.

The Office Action states that “the general statements in Gould lead one in the art to appreciate insertion in any number of positions, thus resulting in end capping; motivated by Green’s showing of enhanced antimicrobial efficacy.” Accordingly, it appears that the Office Action is stating that (i) Gould teaches a water soluble composition comprising a polyurethane polymer including at least one antimicrobial quaternary ammonium group, (ii) that the antimicrobial quaternary ammonium group may be positioned at a terminal position of the polyurethane, and (iii) one would be motivated to endcap at the terminal position because Green shows enhanced antimicrobial efficacy with endcapped quaternary ammonium groups. It appears that the rationale is flawed for several reasons.

First, it does not appear that Gould teaches an **antimicrobial** quaternary ammonium group. Gould teaches, among other things, reacting one or more diols with a polyisocyanate and a polyfunctional lactone (see, col. 1, lines 15-25) to obtain a polyurethane having a hydroxyl group (see, col. 3, line 21). The polyurethane having a hydroxyl group in the polymer backbone is reacted with an organic chloride in the presence of a strong base to form a polyurethane quaternary ammonium hydroxide (see, col. 3, lines 19-28), which may be converted to a corresponding chloride, sulfate, etc. salt. (see, col.3, lines 55-68). Applicant is unaware that such a reaction would produce a quaternary ammonium with any appreciable antimicrobial activity, regardless of which nitrogen in the polyurethane backbone was substituted with the organic portion of the organic chloride. Gould is silent as to whether such reactions result in quaternary ammonium compounds having antimicrobial activity, but rather states that such reaction product result in hydrophilic polyurethane quaternary ammonium salts that make it possible to “make an aqueous solution of the hydrophilic polyurethane quaternary ammonium salt that is essentially free of organic solvents and apply coatings from solution while avoiding the fume and fire hazards that may occur when organic solvents are present.” (Col. 4, lines 37-42).

Second, Green does not appear to teach that polymers capped with a quaternary ammonium moiety have better efficacy than those not capped with such a moiety. While Green does teach that such capped polymers do exhibit antimicrobial properties, Green appears to be devoid of any teaching that capping the polymers with quaternary ammonium moieties results in better antimicrobial efficacy than those not capped with such moieties. All of the polymers tested for antimicrobial testing in Green appear to be capped with a quaternary ammonium moiety. As such, there does not appear to be any teaching in Green that would motivate one to modify Gould to obtain a polymer with a capped quaternary ammonium moiety. As stated above, even if one were motivated by Green to modify Gould to obtain polyurethane polymers capped with a quaternary ammonium moiety, one would not obtain an antimicrobial quaternary ammonium moiety.

In addition, as Gould does not appear to disclose polymers having antimicrobial activity the Office Action has provided insufficient motivation to combine the teachings of Gould with Green, which is directed to antimicrobial polymers. Furthermore, as stated in the May 5, 2006 Response to the February 8, 2006 Office Action, Green fails to disclose a polyurethane polymer, and thus one would not look to Green to modify Gould.

Further, one would not be able to modify Gould in accordance with Green to arrive at an endcapped polyurethane quaternary ammonium polymer. Green requires the presence of a terminal halide to form the quaternary ammonium (via reaction with a mono-functional tertiary amine). The reaction taught by Gould (reacting an organic chloride with a polyurethane in the presence of a strong base) would not produce a terminal chloride required for the reaction taught by Green.

As the pending Office Action does not mention Vandergaer, Applicant assumes that the rationale for the pending Office Action is the same as the February 8, 2006 Office Action with regard to Vandergaer. The February 8, 2006 Office Action stated that it would have been obvious to modify Vandergaer as shown by Green to provide an antimicrobial effect. However, the Office Action appears to neglect that the teachings of Vandergaer and Green are incompatible (similar to the incompatibility of the teachings of Gould and Green). That is, Vandergaer teaches reacting a terminal isocyanate group with a quaternized tertiary amino alcohol, thereby rendering the terminal isocyanate group incompatible with the reaction proposed by Green. One cannot combine the teachings of Vandergaer and Green to obtain a polymer having properties of both Vandergaer and Green. As such, one would not be motivated to combine the teachings of Vandergaer and Green, nor would one have any reasonable expectation of success in combining the teaching of these two references.

For at least the reasons discussed above, independent claims 45 and 57 are not obvious in light of the combination of Gould, Green and Vandergaer. Accordingly, claims 49-56, which depend from claim 45, are also not obvious.

In addition, with regard to claims 49 and 50, if one were to modify Gould to obtain a polyurethane polymer with a capped quaternary ammonium group, one clearly would not obtain a quaternary ammonium group according to claims 49 or 50. As indicated above, Gould teaches the addition of an organic group of an organic chloride to a nitrogen in the backbone of a polyurethane polymer to form a polyurethane polymer having a quaternary ammonium group. Claim 49 recites that the at least one antimicrobial quaternary ammonium group is located on an addition polymerized group and that the addition group is formed by reaction of a monol or polyol vinylic compound with a vinylic compound having at least one antimicrobial quaternary ammonium group. Adding an organic group of an organic chloride to a nitrogen in the polyurethane backbone would not result in such an addition polymerized group. With regard to

claim 50, one would clearly not arrive at the recited antimicrobial quaternary ammonium groups based on the teachings of Gould.

Applicant respectfully assert that the claims 45 and 49-57 are not obvious. Withdrawal of this rejection is respectfully requested.

In view of the foregoing amendments, Applicants respectfully request reconsideration and allowance of the claims as all rejections have been overcome. Early notice of allowability is kindly requested. Should the Examiner feel a telephone interview would be helpful in advancing this case to allowance, Applicant invites the Examiner to contact their representative at the number provided below.

Please continue to transmit all correspondence to:

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Respectfully submitted,

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